

Although the author accounts for many of the other surface features and changes as recorded on the Martian disc, he is unable to suggest any satisfactory explanation of the doubling of the canals.

Enough, perhaps, has been said to indicate that in these pages we have some very original ideas on a subject of all-absorbing interest. It must nevertheless be left to the reader to form his own judgment as to the probability of the views put forward when he has carefully read the book.

We can unhesitatingly recommend this book to a very large circle of our readers, and more especially to those who have followed the previous publications relating to this subject. The last word on this difficult question has not been said yet, and the present issue will very likely re-kindle the flame.

WILLIAM J. S. LOCKYER.

AGRICULTURE IN FRANCE.

- (1) *Races bovines. France—Étranger.* Pp. 426. Price 5 francs. (2) *Races chevalines.* Pp. viii + 467. Price 5 francs. By Prof. Paul Diffloth. Encyclopédie agricole. Zootechnie. (Paris: J. B. Baillière et Fils, 1908.)

IN the first of these volumes of the Encyclopedia Prof.

Diffloth claims that special attention has been paid to varieties, to methods of selection and to breeding, and the author is to be congratulated on the success of his efforts. The book is a very valuable contribution to our knowledge of domesticated cattle; it treats, with commendable breadth and sufficient detail, not only of the characteristics of a great number of breeds and varieties of those breeds, but of certain of the physical conditions under which they thrive and of their geographical distribution.

Part i., which occupies thirty-four pages, begins with a short description of external features, head, body, limbs, teeth, horns, coat and colour, followed by brief notes on some of the anatomical variations which are specially marked in different races.

Part ii. fills the remainder of the book. The classification adopted by the author is based partly on Sanson's scheme of skull measurement, by which all species are divided into two main groups in accordance with the angle formed by a line drawn across the forehead at the base of the horns and a line from the base of one horn to the outer edge of the eye of the same side. When the angle so formed is a right angle, the type is recognised as brachycephalic, when it is obtuse as dolicocephalic. It is pointed out, however, that such classification is by no means a sufficient guide, and that various other external features, such as the form of the crest between the horns, the curve of the horns themselves, &c., must also be taken into account for practical purposes.

Twelve main races are recognised, and these are again subdivided into eighty-five varieties, as follows:—

- (1) Low countries, with fifteen varieties; (2) German, three varieties; (3) Irish, five varieties; (4) Alpine, eight varieties; (5) Aquitaine, eight varieties;

- (6) Scythian, eight varieties; (7) Vendéenne, seven varieties; (8) Auvergnate, three varieties; (9) Jurassic, fourteen varieties; (10) Ibérique, six varieties; (11) Asiatic, seven varieties; (12) Scotch, represented only by the breed of that country.

Each variety is described; its origin, relation to other breeds, and the effects of crossing are discussed; its special capabilities are examined; the physical conditions of the geographical area it inhabits are generally noted, and their possible effect upon the breed is referred to.

A series of seven maps is of special interest. They are designed to show the areas over which certain races and varieties range, and in some cases their special breeding area is further distinguished. With two exceptions these maps refer to French breeds, the Dutch and Austro-Hungarian races being the only others so treated. This scheme is a most suggestive one, and if consistently carried out would be a very valuable aid both to the student and the practical breeder.

The text is full of valuable information concisely and clearly presented, especially valuable to English readers where it treats of French breeds. Besides figures in the text, many of which leave very much to be desired, there are forty plates, photogravures of selected animals.

The space at our disposal allows of only a very brief notice of the second volume. This book is equally carefully compiled, and is a valuable aid to the student, especially in relation to the natural conditions under which the various races and varieties of the horse thrive.

The author's classification scheme will not, perhaps, satisfy many authorities, but his descriptions of the characteristics of the very numerous varieties he recognises are clear and unbiased, and the figures and plates are good.

His statistics regarding the horse population of the world are no doubt open to criticism, but they cannot be questioned in relation to the conclusion he draws that the advent of the motor-car and agricultural machinery has been followed by an increase both in the numbers and value of horses. The view that Government aid is necessary for the breeding of certain classes of horses in this country receives substantial support from the author's description of the results gained by the care given and the large sums expended by his own Government for this purpose. Short chapters on the ass and the mules conclude the volume.

CHEMISTRY IN THE SEVENTEENTH CENTURY.

Medico-Physical Works of John Mayow (1674). Pp. xxiii + 331; with 6 plates. (Edinburgh: The Alembic Club, 1907.)

ALTHOUGH the name of John Mayow is well known to chemists, there are few who are acquainted with his works. Even the majority of the historians of chemistry have been content to acquire

their knowledge of him at second hand, so that his discoveries and views are generally stated with more or less inaccuracy. This becomes clear on perusing the present work, a translation from the Latin of Mayow's five treatises, for which we are indebted to the Alembic Club.

The basis of Mayow's work was his recognition of the existence in the air and in common nitre of extremely subtle particles to which he gave the name "nitro-aërial spirit." He did not, however, as is often supposed, regard air as a mixture of two gases, as we do to-day, but considered the nitro-aërial particles to be "fixed in the aërial particles themselves," and to be "torn from them by the burning of a lamp or the breathing of animals." They are, in fact, "neither air itself nor some material interspersed among its particles." Whilst the generally received opinion is correct that Mayow recognised that an increase of weight occurs when metals are burnt in air, it is also true that he made but little use of this fundamentally important observation; in the main his experiments were purely qualitative, and ingenious as they often were, they served in many cases to distract the attention from the real issue. Had it been otherwise the course of chemical history might have been different.

When it is remembered that, in Mayow's time, fire and air, mercury, sulphur, and salt were regarded as the fundamental elements, the clearness and originality of his views is very striking. He substitutes his nitro-aërial spirit (which we now call oxygen) for air and fire, and considers that out of the conflict of this spirit with "sulphur" (that is, the combustible constituent of substances) "all the changes of things arise." At each step he feels his way by new experiments, as, for example, when he shows that a mouse, in breathing, diminishes the volume of air like a burning candle, or that, when put in a glass vessel along with a lamp, it will not breathe much longer than half the time it would otherwise have lived. His views on respiration are quite correct; by way of the lungs "the aërial particles enter the mass of the blood and are there deprived of their nitro-aërial particles." The latter are indeed "the principal instruments of life and motion." He scoffs at the idea of a vital flame as a source of animal heat, accounting for the latter by "the nitro-aërial particles in the blood fermenting with its saline-sulphureous particles" (or, as we should say, by the oxidation of combustible material).

It was probably unfortunate that Mayow sought to explain by the aid of his nitro-aërial spirit the most diverse phenomena, such as the elasticity of solids, the nature of light and colours, of lightning and the transmission of nerve impulses, for in so doing the more important facts established were obscured in a haze of speculation which Mayow's early death prevented him from dispelling; thus it happened that exactly a century had to elapse before the work of Scheele, Priestley, and Lavoisier led to a re-discovery of principles already clearly enunciated as early as 1674.

W. A. D.

TOWN GAS.

Town Gas and its Uses for the Production of Light, Heat and Motive Power. By W. H. Y. Webber. Pp. vii + 275. (London: A. Constable and Co., Ltd., 1907.) Price 6s. net.

THE opening lines to the preface of this book supply the keynote to all that follows—"This book is a summary of what I know, that appears to me to be likely to interest a generally well-informed but not technically instructed reader about the manufacture of town gas and its uses."

The author, who was for many years the subeditor of the chief organ of the gas industry, has brought to bear his wide knowledge and ripe experience of the subject, and has given us a book that will be welcomed by all consumers of gas who desire an insight into the mysteries of its manufacture, and the best way to consume it for either heat, light, or power. The term "town gas" is used in preference to coal gas in order to cover the admixture of carburetted water gas and coal gas now so often distributed as a town supply, and which was necessitated chiefly by the demand for high candle-power gas, whilst now that the incandescent mantle has rendered rich gas not only unnecessary but wasteful, it is to be sincerely hoped in the interests of the consumer that carburetted water gas will disappear, and that only unadulterated coal gas will again become the general supply.

Excellent as is the book as a whole, there are many points that invite criticism; it was to be expected that the author would be an ardent champion of the virtues of coal gas, but surely when (pp. 175, 176) he is comparing the relative cost of coal and gas as a fuel for domestic use, and debits the cost of coal with a servant's wages and keep at 4*l.* a month, so bringing the cost of the coal as a fuel to 5*l.* 15*s.* a ton, he is going too far, and is more likely to do his cause harm than good. Burnt in properly constructed gas stoves, so arranged that none of the products of combustion find their way into the air of the room, coal gas is an ideal fuel, and, taking into consideration the cleanliness, saving in labour, convenience, and the fact that it need only be used when wanted, it can be shown to be equal in cost at 2*s.* 6*d.* per 1000 cubic feet to coal at 24*s.* per ton, but beyond this its most ardent advocate would scarcely venture to go.

Again, in speaking of the smoke curse and its prevention, he says (p. 227), "Gas is the sole practicable cure for this crying evil"—a statement which would not be endorsed by the advocates of smokeless fuels, such as anthracite, coke, coalite, or its imitations.

Some small inaccuracies might with advantage be corrected in a future edition; for instance, no gas manager would be inclined to accept as an average example of the normal supply to "the British Metropolitan region" a gas containing 15.52 per cent. of carbon monoxide, 1.5 per cent. of carbon dioxide, and 5.31 per cent. of nitrogen (p. 5).

On p. 69 the author speaks of blue water gas being made by the "methane-hydrogen plant"; this form of apparatus, however, should be deleted from amongst the "blue" gas plants, as its value is dependent upon